

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-15. (Canceled)

16. (Currently Amended) A process for forming an insulating film on the surface of a substrate for an electronic device, comprising the steps of:

~~a first step of~~ cleaning the substrate with plasma based on a first process gas comprising at least a rare gas; and

~~a second step of~~ oxidizing the substrate with plasma based on a second process gas comprising at least a rare gas and oxygen, to thereby form an oxide film thereon;

wherein the ~~first and second~~ cleaning and oxidizing steps are conducted under the same operation principle; and

the cleaning and oxidizing steps are conducted in the same vessel without exposure of the substrate to air.

17. (Previously Presented) A process for forming an insulating film according to claim 16, wherein the first process gas comprises hydrogen gas.

18. (Previously Presented) A process for forming an insulating film according to claim 16, wherein the first step is conducted at a pressure of 7-133 Pa.

19. (Previously Presented) A process for forming an insulating film according to claim 16, wherein the first and second steps are conducted in the same processing chamber or in different processing chambers under the same operation principle.

20. (Previously Presented) A process for forming an insulating film according to claim 16, which further comprises a third step to be conducted after the second step, of nitriding the oxide film with plasma based on a third process gas comprising at least a rare gas and nitrogen.

21. (Previously Presented) A process for forming an insulating film according to claim 20, which further comprises a fourth step to be conducted after the third step, of treating the oxide film with plasma based on a fourth process gas comprising hydrogen gas.

22. (Previously Presented) A process for forming an insulating film according to claim 16, which further comprises a fifth step to be conducted after

the second step, of treating the oxide film with plasma based on a fifth process gas comprising hydrogen gas.

23. (Previously Presented) A process for forming an insulating film according to claim 21, which further comprises a step to be conducted after the fourth step, of forming a High-k film.

24. (Previously Presented) A process for forming an insulating film according to claim 22, which further comprises a step to be conducted after the fifth step, of forming a High-k film.

25. (Currently Amended) A process for forming an insulating film on the surface of a substrate for electronic device, comprising the steps of:

~~a first step of~~ cleaning the substrate with plasma based on a first process gas comprising at least a rare gas; and

~~a second step of~~ nitriding the substrate with plasma based on a second process gas comprising at least a rare gas and nitrogen, to thereby form a nitride film thereon;

wherein the ~~first and second~~ cleaning and nitriding steps are conducted under the same operation principle; and

the cleaning and nitriding steps are conducted in the same vessel without exposure of the substrate to air.

26. (Previously Presented) A process for forming an insulating film according to claim 25, wherein the first process gas comprises hydrogen gas.

27. (Previously Presented) A process for forming an insulating film according to claim 25, wherein the first step is conducted at a pressure of 7-133 Pa.

28. (Previously Presented) A process for forming an insulating film according to claim 25, wherein the first and second steps are conducted in the same processing chamber or in different processing chambers under the same operation principle.

29. (Previously Presented) A process for forming an insulating film according to claim 25, which further comprises a third step to be conducted after the second step, of oxidizing the nitride film with plasma based on a third process gas comprising at least a rare gas and oxygen.

30. (Previously Presented) A process for forming an insulating film according to claim 29, which further comprises a fourth step to be conducted after the third step, of treating the nitride film with plasma based on a fourth process gas comprising hydrogen gas.

31. (Previously Presented) A process for forming an insulating film according to claim 25, which further comprises a fifth step to be conducted after the second step, of treating the nitride film with plasma based on a fifth process gas comprising hydrogen gas.

32. (Previously Presented) A process for forming an insulating film according to claim 30, which further comprises a step to be conducted after the fourth step, of forming a High-k film.

33. (Previously Presented) A process for forming an insulating film according to claim 31, which further comprises a step to be conducted after the fifth step, of forming a High-k film.

34-41. (Canceled)

42. (Previously Presented) A process for forming an insulating film according to claim 20, wherein the third step is conducted in a processing chamber that is the same as or different from the processing chamber wherein the first and second steps are conducted.

43. (Previously Presented) A process for forming an insulating film according to claim 21 wherein the fourth step is conducted in a processing

chamber that is the same as or different from the processing chamber wherein the first and second steps are conducted.

44. (Previously Presented) A process for forming an insulating film according to claim 22 wherein the fifth step is conducted in a processing chamber that is the same as or different from the processing chamber wherein the first and second steps are conducted.

45. (Previously Presented) A process for forming an insulating film according to claim 29, wherein the third step is conducted in a processing chamber that is the same as or different from the processing chamber wherein the first and second steps are conducted.

46. (Previously Presented) A process for forming an insulating film according to claim 30, wherein the fourth step is conducted in a processing chamber that is the same as or different from the processing chamber wherein the first and second steps are conducted.

47. (Previously Presented) A process for forming an insulating film according to claim 31, wherein the fifth step is conducted in a processing chamber that is the same as or different from the processing chamber wherein the first and second steps are conducted.

48-51. (Canceled)

52. (Currently Amended) A process for forming an insulating film according to claim [[16]] 54, wherein the plasma is generated by using a plane antenna member having a plurality of slots.

53. (Currently Amended) A process for forming an insulating film according to claim [[25]] 55, wherein the plasma is generated by using a plane antenna member having a plurality of slots.

54. (Currently Amended) A process for forming an insulating film according to claim [[52]] 16, wherein the plasma is generated using microwave irradiation.

55. (Currently Amended) A process for forming an insulating film according to claim [[53]] 25, wherein the plasma is generated using microwave irradiation.

56. (Currently Amended) A process for forming an insulating film according to claim 23, wherein the High-k film comprises at least one material

selected from the group consisting of Al₂O₃, ZrO₂, HfO₂, Ta₂O₅, ~~silicates and aluminates~~ ZrSiO, HfSiO and ZrAlO.

57. (Currently Amended) A process for forming an insulating film according to claim 24, wherein the High-k film comprises at least one material selected from the group consisting of Al₂O₃, ZrO₂, HfO₂, Ta₂O₅, ~~silicates and aluminates~~ ZrSiO, HfSiO and ZrAlO.

58. (Currently Amended) A process for forming an insulating film according to claim 32, wherein the High-k film comprises at least one material selected from the group consisting of Al₂O₃, ZrO₂, HfO₂, Ta₂O₅, ~~silicates and aluminates~~ ZrSiO, HfSiO and ZrAlO.

59. (Currently Amended) A process for forming an insulating film according to claim 33, wherein the High-k film comprises at least one material selected from the group consisting of Al₂O₃, ZrO₂, HfO₂, Ta₂O₅, ~~silicates and aluminates~~ ZrSiO, HfSiO or ZrAlO.

60-63. (Canceled)

64. (Previously Presented) A process for forming an insulating film according to claim 16 wherein the insulating film is a gate insulator.

65. (Previously Presented) A process for forming an insulating film according to claim 25 wherein the insulating film is a gate insulator.

66. (Withdrawn) A semiconductor device manufacturing system for conducting a process for forming an insulating film on the surface of a substrate for an electronic device, the system comprising:

 a cassette containing a substrate;
 a transportation chamber for transporting the substrate;
 a first arm for disposing the substrate in the transportation chamber;

 a plurality of plasma processing units for conducting treatments on the substrate, which is to be introduced into the plasma processing unit via the arm connected to the transportation chamber;

 a load lock unit for conducting the communication and isolation between the cassette and the transportation chamber via a second arm;

 wherein the plasma processing unit conducts a process comprising a first step of cleaning the substrate with plasma based on a first process gas comprising at least a rare gas; and a second step of oxidizing or nitriding the substrate with plasma based on a second process gas, to thereby form an oxide or nitride film thereon; wherein the first and second steps are conducted under the same operation principle.

67. (Withdrawn) A semiconductor device manufacturing system according to claim 66, which further comprises a heating unit for operating heating treatment.

68. (Withdrawn) A semiconductor device manufacturing system according to claim 66, which further comprises a heating reaction furnace for conducting heating treatment on the substrate.

69. (Withdrawn) A semiconductor device manufacturing system according to claim 66, wherein any of the plasma processing unit conducts a fourth step of treating the insulating film with plasma based on a fourth process gas comprising hydrogen gas.

70. (Withdrawn) A semiconductor device manufacturing system according to claim 66, wherein the heating unit conducts a step of forming a High-k film.

71. (Previously Presented) A process for forming an insulating film according to claim 16 wherein the substrate is subjected to wet cleaning prior to the plasma cleaning.

Serial No. 10/509,370
Reply to Office Action
May 29, 2007

72. (Previously Presented) A process for forming an insulating film according to claim 25 wherein the substrate is subjected to wet cleaning prior to the plasma cleaning.